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CIA-RDP81-00280R000200100026-7

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THE RESULTS AND SIGNIFICANCE OF SURGICAL RESEARCH IN  
THE FIELD OF UROLOGY IN HUNGARY

A Magyar Tudomány Tíz Éve  
1945-1955 /Ten Years of  
Science in Hungary 1945-1955,  
1955, Budapest, Pages 235-240

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Urological surgery has a tradition in Hungary and Hungarian achievements in this field are acknowledged on an international scale. This is due mostly to the research of Sandor Koranyi on the functional pathology and therapy of kidney diseases, upon which his younger contemporary Geza Illyes based the further development of the field of urological surgery. Thus, Hungary is second only to France among the European countries, and urological surgery has been in existence and has flourished as an independent school since 1920.

The 25 years prior to Liberation were characterized, aside from the initial difficulties, by practical activity and by the development and exploitation of simple diagnostic and surgical methods. However, this did not preclude scientific activity. Some attempts were made at partial research, most of which were concerned with medicinal therapy, but unfortunately these research projects usually were random undertakings and did not take account of the unity of the organism and the interrelationship of diseases. The main scientific progress during this period was the utilization of the advance findings of other theoretical branches of science in the field of urological surgery.

For the most part, systematic, purposeful scientific research in the field of urological surgery began in Hungary in the period following the liberation. The contributing factors of this development included financial support of scientific research in this field on a scale much larger than ever before, detailed study of the Pavlovian concepts, and the world-wide rapid development of medical science.

In the newly systematized field of urological surgery, scientific research was directed at the perfection of practical results through appurtenant theoretical research, and the support of methods already in practical use through further theoretical research. The aim in surgery in general, and in urological surgery in particular is not only the saving of the organs which are operated upon, but that the long-range functioning of such organs would not disturb, but should efficiently serve the life of the patient.

In the field of surgical treatment of the renal cavity system the goal was established that the surgical intervention should not only terminate the pathological condition, but the surgery should leave no defect in the functioning of the operated organ, or should reduce these defects to a minimum. Toward the achievement of this goal experiments were conducted on investigation of the hydromechanism of the renal cavity system. As a result of these investigations a new light was thrown on the structure and functioning of the renal calixes, the renal pelvis, and the ureters. A new surgical operation for the removal of kidney stones, that of calcycotomy, was based on these investigations. This surgical method has many advantages over all other operations performed for similar purposes. These advantages include a considerable decrease in the recuperative period, the postoperative period is much more comfortable to the patient, drainage of the renal cavity system is unnecessary, and it has practically eliminated the necessity of performing the dangerous



operation of nephrotomy. The technical procedure of this operation is simple and may be easily learned and its use now is widespread in Hungary, where it was originally developed. Of all the surgical procedures involving the renal cavity system this operation conforms the most closely to the physiological requirements of the body and as a result the number of corrective operations has decreased considerably.

The domestic investigations on the hydromechanism of the renal cavity system established for the first time in international literature that the blocked kidney does not cease to function, as had previously been assumed. This discovery had very important theoretical and practical results. This discovery had an important effect on the indication of the necessity of surgical intervention in blocked kidneys, specifically in respect to the waiting period in conjunction with determination of the consequences of kidney stones which are caught in the ureter. The discovery of the fact that a blocked kidney continues to function created a broad basis for further physiological and pathological research. This discovery necessitated reconsideration of the theory of the formation of an encapsulated kidney. Extensive research was conducted along this line. It was found that the pressure increases greatly first in the renal pelvis and then in the renal calixes, and the pressure gradually reaches a constant. Amidst the pathological conditions which arise in this manner the secreted urine resorbed through tissue openings and begins a process in the kidney tissue which leads to increasing death of the kidney tissue. In the course of the investigation of this process the importance of the renal lymphatic vessels and of the renal lymphatic circulation was discovered. For the first time anywhere in the world it was demonstrated at the Budapest Urological Surgery Clinic that the lymphatic vessels of a blocked kidney become visibly enlarged. The pathological condition in which the urine is resorbed into renal tissue interstitium is a result of this great enlargement of the lymphatic vessels. It was established experimentally that large quantities of histamine (H-substance) are released in the tissue of a blocked kidney. This increases the permeability of the capillary walls, which increases the interstitial protein content or, more simply, leads to edema of the interstitium. The distention of the lymphatic vessels is a result of the carrying off the pathological increase in interstitial edema. It was proved that if the carrying off of lymph through the efferent lymphatic vessels is not hindered the parenchyma cells which have been permanently damaged by the interstitial edema are gradually sloughed off and carried away in the lymph. Over a long period of time this process leads to thinning and disappearance of the entire renal tissue, and to hydronephrosis. The new theory of the origin of hydronephrosis based on detailed study of the anatomy of the renal lymphatic vessels and the physiology of the renal lymphatic circulation now is generally accepted and has been adopted for use in the new text books.

The investigations on lymphatic circulation further enabled the development of a new theory of the death of an infected kidney by proving that there is a mechanical defect in the efferent lymphatic vessels in pyelonephritis and perinephritis, and that this deficiency hinders the continuous removal of the high protein-content interstitial fluid, which results not in hydronephrosis, but in scarring, and finally shrinkage of the renal tissue. Therefore, the mechanical deficiency of the lymphatic vessels is the most important factor in the scarring of renal tissue during inflammation of the renal region. The extensive research conducted along this line led to the discovery of many new facts of importance to diagnosis and to the development of many new renal therapeutic and preventive measures. These include rigorous early treatment of inflammation of the renal pelvis, the necessity of early

removal of kidney stones which cause practically no pain at all (sterile), the development of x-ray diagnosis and evaluation of peripyelitis and periureteritis, and the surgical removal of inflamed granulated tissue surrounding the renal pelvis.

The development of a method for exploration of the renal lymphatic circulation made possible the study of the lymphatic system of other organs. This is especially important since the previously used methods (various injection methods) led to false conclusions.

Further investigations in the field of lymphatic ducts led to the discovery that, contrary to the previous assumption, there are no lymph capillaries between the canaliculi of the testicle and epididymis. All blood protein fractions may be found in the lymph originating in the testicle. It was also established that tuberculosis of the epididymis cannot spread to the testicles via the "intercanicular" lymphatic network. These theoretical discoveries gave rise to the practical results that the injured testicular tissue should not be placed back in position, that serous testicular inflammation leads to testicular sclerosis and aspermia, and the valuable clinical indication that a thick, turgid funiculus in cases of epididymal inflammation is a sign that the pathological process has extended into the testicular tissue. In such cases attempts at conservative therapy are purposeless. The investigations of the lymphatic vessel system also led to the proof that the Disse space in the liver is not an artifact but is a part of the liver interstitium, and the Disse space is joined to the liver lymphatic system through the periportal space.

Thus the new discoveries made in connection with the hydromechanism of the renal cavity system and the renal lymphatic vessels serves as a basis for the so-called conservative renal surgery, which is aimed at conservation and retention of the kidney. On the basis of these theoretical discoveries it is possible, in surgical intervention, to save all or at least part of the kidney despite serious inflammatory processes affecting the kidney. In addition to their practical significance, these research results offer a basis for further, detailed study of the lymphatic circulation of the kidney and of other organs.

Investigation of ureter movements in living humans also produced many important results. The method developed by the research group, which included the present author, is readily utilized in medical practice, and enabled determination of the extent to which a pathologically altered ureter can contract and enables the determination of even more important theoretical results. Specifically, it was shown that the ureters react to emotional stimuli in the live human with continuous changes during the course of their functioning. This led to very important conclusions concerning ureteral disfunction which has furthered progress in the determination of the formogenesis of kidney stones. These investigations also have produced concrete results which have practical significance both for preventive measures and surgical operations.

Research on the origination of urinary calculi also are constantly under way. According to the literature the formation of urinary calculi consists in the seed of the stone originating because of "discolloiduria," which has not been definitely analyzed, and this stone seed automatically grows via "apposition" in the supersaturated urine. According to clinical observations the urine always contains discontinua which may serve as the "seed" of a urinary calculus. A bladder stone is not always formed, however, because the salt saturation of the urine itself does not cause the growth of a stone even if the stone seed is retained in the

urine for an extended period of time. In the light of the above investigations the coincidence of 3 definite factors is necessary for the origination and growth of a urinary calculus: (1) extended retention of the urinary calculus seed in the urinary passages, which may be caused by a slight natural disfiguration or disfunction of the urinary transportation system; (2) moderate (15 to 60%) excess of water in the urine, and (3) the oscillation of the urine pH around one particular value. All the nervous, metabolic and local disturbances which vary from normal are the basis of the formation of a urinary calculus through making possible the coincidence of these 3 factors. This theory, which has been proved in partial experiments, is now a part of the general literature and, with due consideration to other factors, gives orientation on the possible measures for prevention of kidney stones.

An original surgical operation which has good practical results and has a good outlook, although its theoretical basis still has not been very thoroughly explored, is now being developed. Especially in children, and not so rarely in adults, inflammatory or degenerative afflictions of the central nervous system (encephalitis and myelitis) are followed by serious bladder evacuation difficulties which in time may be fatal due to deterioration of kidney function. The basis of these conditions is defective bladder reflex function, in which the functional balance between the bladder detrusor musculature and its fascicle which extends to the neck of the bladder, and the musculus trigonalis. The continuous hypertonicity of the neck of the bladder results in an enduring pathological change which causes rigidity of the bladder. The result of the latter is a constant increase in urine retention and great distention of the bladder. The surgical treatment of rigidity of the bladder is extravescicular intersection of the scarred tissue without opening the bladder interior. With this surgical procedure the stiff bladder neck is successfully relaxed and urine evacuation returns to normal. Approximately 30 patients suffering from urinary evacuation disturbances of nervous origin have received permanent cures by this method, who had received only temporary cures from the previous regular treatment. Hungarian experts already have developed skill in this new type operation, and the details of the procedure are now being published.

In addition to the research achievements described above, Hungarian urological surgery has been enriched by the addition of many new discoveries. Among these discoveries is the development of an auxiliary diagnostic method for the continuous distinction between kidney tumor and advanced, suppurative kidney inflammations based on paper-electrophoresis testing of blood proteins. In the course of the investigation of 17-ketosteroid secretion it was established that orchidectomy is unnecessary in certain prostatic diseases. It was experimentally established that inflammation of the prostate gland can serve as an important focus of secondary diseases, and can be the cause of changes in distant organs such as the liver, kidneys and heart. In connection with experiments on uremia it was demonstrated that the creatinin burdening of the kidneys results in lasting damage to the tubulus cells of the kidney, or uremia, and at the same time, the excess of uric acid has a damaging effect on the healthy kidney tissue, also.

Research on sterility of the male also has been strongly emphasized, and a large amount of significant material has been processed which compares favorably with the international scale of treatment of this problem, and successful surgical operations have been performed following the collection of appurtenant literature, which are very rare in the field of medical literature.



The adoption or modification of surgical and other therapeutic measures which originated abroad also constitute part of Hungarian research and research results. These include the surgical procedure of retropubic prostatectomy, bladder fistulae operations, the development of various types of artificial kidneys, extension of the practical utilization of uretrosigmoidostomy, partial renal resection, etc.

Hungarian urological surgery has made many basic developments during the past 10 years and has enriched medical science with theoretical and practical achievements of very great importance. It is beyond doubt that the results which have been achieved are connected with the work of those scientists who have worked in this field in the past. The reason that there has been so great progress compared to the past, of which Hungary may be justly proud, is primarily that the Hungarian People's Democracy has extended every material aid to the development of this research. The Hungarian Academy of Sciences contributed in no small measure to this development through the assignment of properly trained personnel to the various experimental laboratories, the assignment of scientific tasks, and through extending aid in the solution of the research problems. Under such circumstances the scientists are inspired to do their best because they understood that through their work they serve the people, their country, and their own welfare and reputations.

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